

THE EFFECTS ON GAIN OF FEEDING SELENIUM TO
COWS AND CALVES AND INJECTING SELENIUM IN CALVES

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Selenium concentration in forage and hay crops in Oregon varies from zero to more than 1 part per million (ppm), and local concentrations often are highly different, even from one ranch to another. The minimum dietary level of selenium should be between .03 and .1 ppm, depending on the content of vitamin E and possibly other substances which may influence selenium utilization. Cattle may build up selenium reserves by consuming high selenium diets for a few months, and these reserves may protect them and their offspring from severe selenium deficiency related diseases for up to a full year.

The most common selenium responsive disease in northwestern United States is white muscle disease which afflicts calves and lambs, especially those less than six months old. Inadequate dietary selenium in cattle on pasture and range can be compensated by including supplemental selenium in the diet or by injecting selenium into cows before they calve. Another common method is to inject calves at birth. Since injection may be difficult for some ranchers, feeding supplemental selenium, especially through salt mixes, is most convenient.

To examine the adequacy of crops in meeting the selenium needs of livestock, samples from different regions of Oregon were collected and analyzed (Figure 1). Most of the analyses were made on alfalfa, because it is grown in most geographical areas. Samples from the western half of Oregon contained very low levels of selenium (less than .05 ppm in more than 80 percent of the samples). Only the Harney Basin in east-central Oregon was found to be generally adequate in selenium concentrations in hay crops. However, ranchers should be aware that even in the Harney Basin, some losses from white muscle disease may be expected, especially if hay from selenium deficient regions is fed.

In a subsequent examination of the selenium content in high summer range, grasses of eastern Oregon showed the same geographic pattern as the earlier study, depicted in Figure 1.

For ranchers who are unable to inject cows and/or calves, feeding selenium may meet the needs of preventing severe deficiencies in cattle. In addition to preventing white muscle disease, administration of selenium as a feed supplement or injection can also affect thriftiness and gain in the cattle. The research described in this report was done to evaluate the effects on gain of feeding selenium to range cows and calves. In addition, feeding and injecting selenium versus no selenium administration were compared to determine any differences in gain.

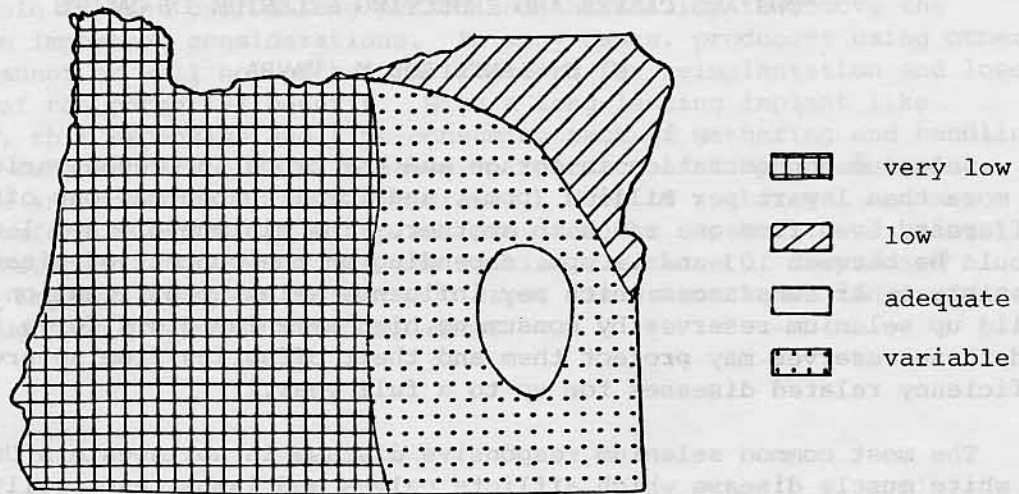


Figure 1. Selenium content of forages in Oregon.

EXPERIMENTAL PROCEDURE

Calves born in February through April of 1981 were used for the studies. All calves were injected with a commercially prepared selenium at birth to prevent white muscle disease. Twenty cow-calf pairs were chosen to be given salt with selenium mixed at the level of 50 ppm. A second group of twenty pairs, with comparable uniformity, was selected to act as a control group and received no supplemental selenium in the salt. The study began on June 1, and all cows and calves in the supplemented and control groups were weighed. The calves remained on range until September 23, at which time they were weaned and placed on alfalfa pasture. The dams remained on range until October 20, when they were placed on alfalfa pasture. Throughout the summer, experimental animals were weighed periodically. When placed on alfalfa pasture, the supplemented groups were given selenium at the level of 30 ppm in the salt.

On October 21, three additional experimental calf groups of 15 animals each were added to the study. The calves in each of these groups were injected with selenium at first weighing. One group received no further injections. A second group received an additional injection of copper at first weighing. A third group received no copper, but was given an additional shot of selenium on December 22. Weights were taken at approximately 30-day intervals until January 19, 1982.

RESULTS AND DISCUSSION

Summer gain data for 1981 spring-born calves and their dams are displayed in Table 1. The periods of weight gain were 115 days for the calves, until they were weaned, and 142 days for the dams, which continued on range after the calves were weaned. The selenium supplemented cattle gained significantly better than the controls. Those receiving selenium in the salt were physically separated from the controls, and the stocking rate of cattle was lower in the pasture containing selenium salt. This may have made the effect of supplementation with selenium even more pronounced.

The improvements in gain for selenium supplemented steers and heifers were .28 and .30 pound per day, respectively. Percentages in improvement in gain over controls for steers and heifers were 12.2 and 14.0 percent, respectively. These improvements in growth from selenium supplementation are compatible with results shown by other scientific studies. Weight gain by cows supplemented with selenium was .56 pound per day greater than in the controls. This is more than 444 percent improvement in gain.

Table 1. Summer gain data of dams and spring-born calves.

Treatment	Average	Average	Average	Increase in gain	
	initial weight	final weight	gain ^{1/}	over control	
	-lb-			%	
Control					
Steers	267	530	263	-	-
Heifers	241	491	250	-	-
Dams	1,067	1,085	18	-	-
Selenium supplemented					
Steers	247	542	295	32	12.2
Heifers	249	534	285	35	14.0
Dams	1,080	1,178	98	80	444.4

^{1/} Periods of gain were 115 days for calves and 142 days for their dams.

The gain data did not continue to follow the same trends in the calves during the fall and winter months (Table 2). Because calf weight gains were not significantly different for steers and heifers during the fall and winter, they were pooled for both sexes. The effects of weaning and changes in diets during the autumn added to variability in growth in the calves.

In addition, a reduction in the level of selenium from 50 to 30 ppm in the salt may have lowered the selenium concentration below the level useful for increasing weight gain. The period of gain for the weights shown in Table 2 was 90 days.

During this time, the selenium supplemented calves gained .11 pounds per day less than the controls, resulting in a decrease in gain by 11.8 percent. The calves injected with selenium increased in gain from .06 to .09 pounds per day over controls. The percentage in improvement in gain over controls ranged from 5.9 to 9.4 percent. These data indicate that selenium was useful in improving gain in growing calves although dietary supplementation at the level of 30 ppm in salt was not enough to cause increased growth. Copper injection did not aid in improving weight gain in selenium injected calves.

Longer term studies will be useful in determining the effects of feeding and injecting selenium in growing calves.

Table 2. Fall and winter gain data of spring-born calves.

Treatment	Average	Average	Average	Increase in gain	
	initial weight	final weight	gain ^{1/}	over control	
	—lb—			%	
Control	507	592	85	-	-
Selenium supplemented	532	607	75	-10	-11.8
Selenium injected					
Injected once	460	553	93	8	9.4
Injected twice	452	544	92	7	8.2
Selenium and copper injected	449	539	90	5	5.9

^{1/} Period of gain is 90 days.

The level of 30 ppm selenium in trace mineralized salt may not be high enough to improve gain in cattle, but it may be sufficient to prevent severe deficiencies leading to white muscle disease. In areas of extreme selenium deficiencies, where calves are born with the disease, the feeding of selenium can be a management asset that eliminates having to give injections to preparturient cows. Dietary supplementation through salt may be particularly beneficial in cattle on range, where it is difficult or impossible to give injections at the optimum time before calving. In addition to the effects of selenium on white muscle disease and growth, selenium has been shown to reduce the incidence of placental retention at the time of calving.

Since most areas of Oregon are known to be deficient in soil and forage contents of selenium, it is recommended that selenium be administered to calves and pregnant cows. Research described has shown that selenium supplemented in a salt mix is effective in increasing gains of cattle on summer range. Injections of selenium also have caused an improvement in gain in calves.

Whether you choose to feed or inject selenium depends on your management system.